

CHAPTER 5 BLM ANSWER KEY

BLM 5-1: Reviewing Energy Concepts

Answers

- (a) You can tell the reaction is exothermic because the energy term is written with the products, meaning heat is produced.
(b) The reaction would increase the temperature of the surroundings; for the surroundings, $T_f > T_i$.
(c) The energy released by forming all chemical bonds in the products is greater than the energy required to break all chemical bonds in the reactants.
- Thermal energy is the total kinetic energy of the particles in a substance. Heat is the transfer of thermal energy from a region of higher to lower temperature. Temperature is a measure of the average thermal energy of the particles in a substance.
- (a) $42.5\text{ }^\circ\text{C}$
(b) 1.34 J
(c) $15.2\text{ }^\circ\text{C}$

BLM 5-2: Thermochemical Equations and Stoichiometry

Answers

- (a) $1.3 \times 10^3\text{ kJ}$
(b) 10 kJ
(c) $\Delta H = -1009\text{ kJ}$
(d) $\Delta H = -5.2\text{ kJ}$
- (a) $\text{CaO}_{(s)} + \text{H}_2\text{O}_{(l)} \rightarrow \text{Ca}(\text{OH})_2 \quad \Delta H = -65.2\text{ kJ}$
(b) $\Delta H = -6.08 \times 10^5\text{ kJ}$
- (a) 373 kJ
(b) $1.21 \times 10^6\text{ kJ}$
(c) 2.1 kg

BLM 5-3: Enthalpy of Neutralization

Answers

- (a) $\text{H}_2\text{X}_{(aq)} + 2\text{NaOH}_{(aq)} \rightarrow \text{Na}_2\text{X}_{(aq)} + 2\text{H}_2\text{O}_{(l)}$
 $\Delta H = -1.1 \times 10^2\text{ kJ/mol}$
(b) No heat is lost to the surroundings, no heat is absorbed by the calorimeter. The solutions have the same density and heat capacity as water.
(c) Wear protective clothing such as glasses, gloves, and apron; avoid contact with corrosive acids and bases; if acid or base is spilled on skin, flush with plenty of cold water; dispose of all solutions as directed by your teacher.
(d) Diagrams should show a coffee-cup calorimeter similar to the one shown on page 240 of the student textbook. Diagrams may also include a graduated cylinder and labelled beakers containing acid and base.

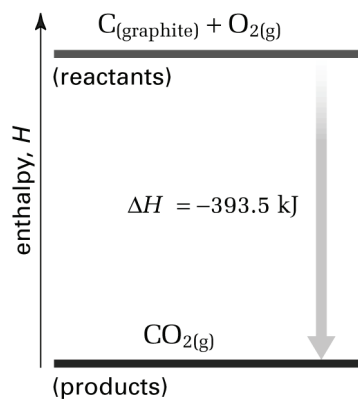
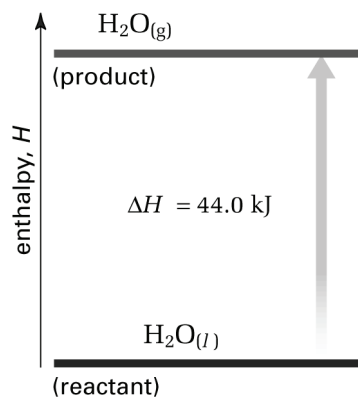
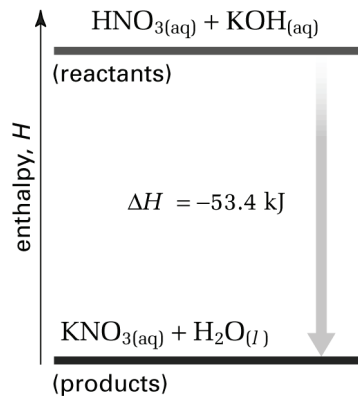
BLM 5-4: Chapter 5 Test

Answers

- (a) $\text{HNO}_{3(aq)} + \text{KOH}_{(aq)} \rightarrow \text{KNO}_{3(aq)} + \text{H}_2\text{O}_{(l)}$
 $\Delta H = -53.4\text{ kJ}$
(b) $\text{H}_2\text{O}_{(l)} \rightarrow \text{H}_2\text{O}_{(g)}$
 $\Delta H = 44.0\text{ kJ}$
(c) $\text{C}_{(\text{graphite})} + \text{O}_{2(g)} \rightarrow \text{CO}_{2(g)}$
 $\Delta H = -393.5\text{ kJ}$

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2.



3. (a) -17.3 kJ/mol

(b) Enthalpy change depends only on initial and final conditions, not on pathway. Therefore, if three equations add up to the target equation, then the sum of the enthalpy changes must equal the enthalpy change of the target equation.

4. (a) $\Delta H^\circ_{\text{rxn}} = -108 \text{ kJ}$

(b) The reaction is exothermic, because the enthalpy change is negative, meaning heat is released.

5. $\Delta H^\circ_{\text{f}} = -1274 \text{ kJ/mol}$